

IOWA DEPARTMENT OF PUBLIC HEALTH

DIVISION OF ACUTE DISEASE PREVENTION AND EMERGENCY RESPONSE AND ENVIRONMENTAL HEALTH
BUREAU OF IMMUNIZATION AND TUBERCULOSIS

Iowa Tuberculosis Control Program 2013 Annual Report



CERTAMEN AD FINEM PERGIT
THE FIGHT CONTINUES
TO THE END



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FOREWORD

TB remains a major health problem globally, in the U.S. and in Iowa, killing an estimated 1.3 million people annually. Despite this grim statistic, TB morbidity rates are declining in the U.S. and around the world. In Iowa, TB case rates remain relatively stable due to the influx of immigrants and refugees from areas of the world where TB is prevalent. Vigilance is required to properly treat and cure patients to prevent treatment relapse, treatment failure or the development of acquired drug resistant TB. Drug shortages, dwindling funding, misdiagnosis and challenging clinical case management still plague TB Control efforts in the United States.

PURPOSE AND OVERVIEW

The purpose of this report is to provide a summary of Tuberculosis (TB) in Iowa and the activities and achievements of the TB Control Program and our partners during the 2013 calendar year. This report provides Iowa-specific TB rates, funding sources, and program-specific data.

The annual report serves as an informational resource for stakeholders, local partners, policy makers and the general public. The report is available for download on the TB Control Program Web page

<http://www.idph.state.ia.us/ImmTB/TB.aspx?prog=Tb&pg=Tb>
[Home](#)

IOWA'S TB CONTROL PROGRAM

The TB Program is comprised of two full time employees: the Program Manager and the TB Nurse Consultant. The program provides direct oversight of cases afflicted with LTBI and TB disease from admission to discharge in the TB Control Program. This includes consultation to physicians, nurses, local public health agencies (LPHAs) and other healthcare providers regarding TB transmission, pathogenesis, treatment, signs and symptoms, infection control practices, and contact investigations.

The purpose and scope of responsibilities is defined by the core functions of the TB Control Program which include:

- Disease consultation and education
- Investigation of active or suspect TB cases
- Case management of active TB cases
- Administration of Iowa's TB Medication Program
- Data management
- Data analysis
- Administration and finance



INTRODUCTION

TB has devastated entire families, generations and countries throughout human history. Science has demonstrated that TB has been present in humans for thousands of years. In 2008, the discovery of the earliest known cases of human TB (9,000 years old) was found in skeletal remains submerged off the coast of Israel, showing the disease is older than previously thought. The bones, thought to be of a mother and baby, were excavated from Alit-Yam, a 9,000 year-old Pre-Pottery Neolithic village, which has been submerged off the coast of Haifa, Israel for thousands of years¹.



The 9,000-year-old remains of a mother and her baby discovered off the coast of Israel provide the earliest concrete evidence of human TB.

Writers have described TB since the dawn of recorded human history, dating back approximately 5,000 years ago. Some authors call TB the first disease known to mankind. Throughout history, people called TB by many names including consumption, phthisis, scrofula, Pott's disease and the White Plague. Because TB can manifest itself in any part of the body, scientists did not identify it as a unified disease until the 1820's and J.L. Schonlein, a German Professor of Medicine, formally named *Tuberculosis* in 1839.

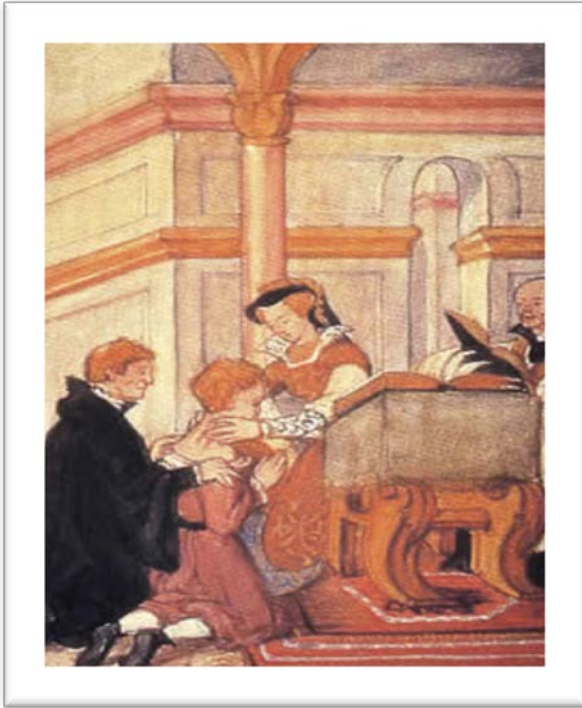
For centuries, medicine could only speculate what caused TB. Doctors and others attempted various approaches seeking a cure including bloodletting, induced vomiting and inhaling animal dung. During the Middle Ages thousands of people sought the "King's touch" to cure scrofula (lymphatic TB).



©2010 The Burns Archive

Bloodletting, the Backbone of Medical Therapy for 3,000 Years
Bloodletting dates back to the ancient Egyptians and Greeks, and was a central part of medical practice into the 19th century. Here, by Burns's reckoning, is one of only three known photographs of the procedure, which purportedly had a calming effect on an ill, feverish, agitated, or delirious patient, but could often lead to shock or even causes death due to the problems it would cause in the body's cardiovascular system. Early TB treatments often included this procedure.

¹ *Science Daily* (Oct. 14, 2008).



Queen Anne of England was one of the last monarchs to perform the “king’s touch” as a cure for lymphatic TB.

THE DIFFERENCE BETWEEN LATENT TB INFECTION AND TB DISEASE:

From CDC’s Division of TB Elimination

WHAT IS TB?

Tuberculosis (TB) is a disease caused by a germ called *Mycobacterium tuberculosis* that is spread from person to person through the air. TB usually affects the lungs, but it can also affect other parts of the body, such as the brain, the kidneys, or the spine. When a person with infectious TB coughs or sneezes, droplet nuclei containing *M. tuberculosis* are expelled into the air. If another person inhales air containing these droplet nuclei, he or she may become infected. However, not everyone infected with TB bacteria becomes sick. As a result, two TB-related conditions exist: latent TB infection and TB disease.

WHAT IS LATENT TB INFECTION?

Persons with latent TB infection do not feel sick and do not have any symptoms. They are infected with *M. tuberculosis*, but do not have TB disease. The only sign of TB infection is a positive reaction to the tuberculin skin test or TB blood test.

Persons with latent TB infection are not infectious and cannot spread TB infection to others.

A person with latent TB infection
<ul style="list-style-type: none"> Usually has a skin test or blood test result indicating TB infection
<ul style="list-style-type: none"> Has a normal chest x-ray and a negative sputum test
<ul style="list-style-type: none"> Has TB bacteria in his/her body that are alive, but inactive
<ul style="list-style-type: none"> Does not feel sick
<ul style="list-style-type: none"> Cannot spread TB bacteria to others
<ul style="list-style-type: none"> Needs treatment for latent TB infection to prevent TB disease; however, if exposed and infected by a person with multidrug-resistant TB (MDR TB) or extensively drug-resistant TB (XDR TB), preventive treatment may not be an option

Figure 1: LTBI Characteristics

TB treatments ran a broad spectrum from prescribed “courses” of starvation to overfeeding, bed rest to extensive exercise and bathing in urine vs. emphasis on personal cleanliness. In the early 20th century, doctors implemented widespread use of pneumothorax, or surgically collapsing the lungs, as a means of treatment.

Eventually, all of these methods gave way to the modern era of TB treatment, notably the use of multiple antibiotics to cure TB disease. Before the discussion can go further, it is important to understand the difference between TB infection, known as latent TB infection or LTBI, and TB disease.

Overall, without treatment, about 5 to 10% of infected persons will develop TB disease at some time in their lives. About half of those people who develop TB will do so within the first two years of infection. For persons whose immune systems are weak, especially those with HIV infection, the risk of developing TB disease is considerably higher than for persons with normal immune systems.

Of special concern are persons infected by someone with extensively drug-resistant TB (XDR TB) who later develop TB disease; these persons will have XDR TB, not regular TB disease.

WHAT IS TB DISEASE?

In some people, TB bacteria overcome the defenses of the immune system and begin to multiply, resulting in the progression from latent TB infection to TB disease. Some people develop TB disease soon after infection, while others develop TB disease later when their immune system becomes weak. The general symptoms of TB disease include:

- Unexplained weight loss
- Loss of appetite
- Night sweats
- Fever/Chills
- Fatigue

The symptoms of TB of the lungs include:

- Coughing for 3 weeks or longer
- Hemoptysis (coughing up blood)
- Chest pain

Other symptoms depend on the part of the body that is affected. **Persons with TB disease are considered infectious and may spread TB bacteria to others.** If TB disease is suspected, persons should be referred for a complete medical evaluation. If it is determined that a person has TB disease, therapy is given to treat it. TB disease is a serious condition and can lead to death if not treated.

A person with TB disease
• Usually has a skin test or blood test result indicating TB infection
• May have an abnormal chest x-ray, or positive sputum smear or culture
• Has TB bacteria in his/her body
• Usually feels sick and may have symptoms such as coughing, fever, and weight loss
• May spread TB bacteria to others
• Needs treatment to treat TB disease

Figure 2: TB Disease Characteristics

HISTORY OF TB IN THE UNITED STATES

TB was among the top leading causes of death during the early part of the 20th Century, claiming over 90,000 lives annually in the United States. TB afflicted men, women and children of all ages, classes and geographic locations. A vicious disease characterized by extreme fatigue, drenching night sweats and a distressing cough, TB literally caused the body to waste away. In advanced stages, people would cough up blood from damaged and dying lung tissue. Due to its infectious nature, several members of a family often suffered from TB.

DEVELOPMENT OF SANATORIUMS

In the 19th century, TB was the major threat to health in Europe and North America. It was thought to be caused by heredity compounded by one's way of life and, even when proved to be an infection, these factors were thought to identify who would catch it.

In 1854, Hermann Brehmer asserted that he could cure TB with a regimen of fresh air, exercise and good nutrition in a sanatorium. Although the medical establishment initially rejected Brehmer's ideas the sanatorium movement steadily caught hold, and within two decades was supported by eminent physicians. Rest replaced Brehmer's exercise, as the key remedy².

In 1885 Edward Livingston Trudeau, an American physician, established the Adirondack Cottage Sanitarium at Saranac Lake for treatment of TB. Soon, most large communities built their own sanatoriums.



Oakdale TB Sanatorium, Oakdale, Iowa

² *The Evolution of the Sanatorium: the first half-century, 1854-1904.* Warren P Faculty of Medicine, University of Manitoba.

Iowa followed this practice as well. Built in 1907, Oakdale Sanatorium was the oldest and largest public TB sanatorium in Iowa. Oakdale served thousands of TB patients until declining usage finally closed its doors in 1981.

The building remained in use, including serving as the States TB laboratory until 2010. In March 2011, wrecking balls tore the historic building down to pave the way for the modern State Hygienic Lab. The Oakdale Sanatorium, and others like Sunny Crest in Dubuque and Broadlawns in Des Moines, were key to isolating infectious TB patients from the rest of the communities in Iowa.

In 1906, about 7,000 to 8,000 Iowans had TB. The State Board of Health and the Iowa Tuberculosis Association worked together to spread information about prevention. They pushed for early testing.³

The National Tuberculosis Association, now known as the American Lung Association (ALA), pioneered Christmas Seals to help raise funds to fight TB. The same year Iowa's Oakdale Sanatorium was built, 1907, a small Sanatorium in Delaware was in jeopardy of closing its doors due to lack of funding. Emily Bissell, a cousin of the sanatoriums' doctor, and veteran fund raiser, developed a plan to sell holiday seals at the local post office for a penny each. At the end of the holiday season, and high profile endorsement by President Roosevelt, the group had raised ten times the needed amount and American Lung Association Christmas Seals were born. The program continues as a fundraiser today.



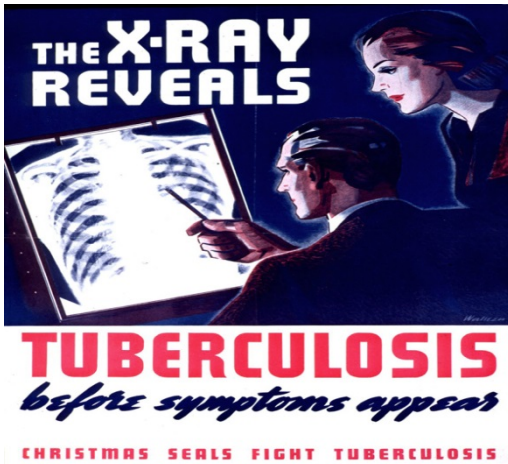
Samples of Christmas Seals – American Lung Association

³ *Tuberculosis: The White Plague in Iowa.* Adapted from original article by Ginalie Swaim, Iowa Heritage Illustrated 86, No. 2 (Summer 2005). Iowa City: State Historical Society of Iowa.



In 1902, the ALA first used the Cross of Lorraine as a symbol for the “crusade” against TB. Many old TB sanatoriums prominently displayed this battle standard atop their buildings (see upper right corner of the Oakdale Sanatorium - photo last page).

Some claim a dual purpose was to “warn” others to stay away from the area as people with deadly TB were gathered.

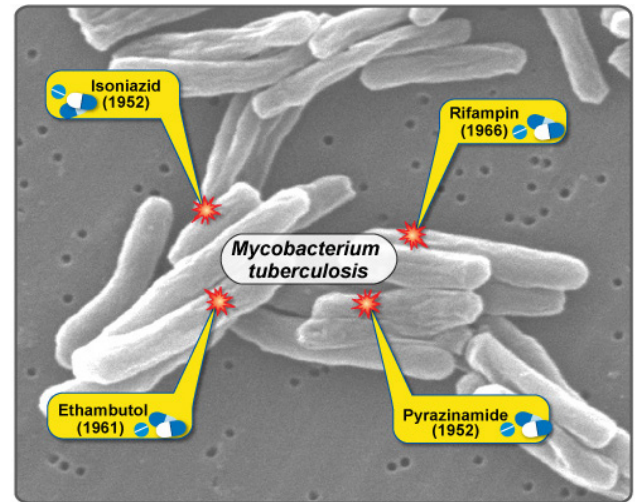


MODERN ERA OF TB CONTROL

The discovery of streptomycin in 1944 and Isoniazid (INH) in 1952 heralded the modern era of TB treatment. The use of INH signaled the ‘beginning of the end’ for TB sanatoriums. However, science soon learned that single drug therapy resulted in treatment relapse. This led to the eventual use of a multi-drug treatment approach that demonstrated TB to be curable. Today, the use of an initial four-drug therapy to cure TB is the standard of practice in TB Control.

By the 1960’s, TB elimination was a foregone conclusion by most public health experts. Steadily declining TB rates from 1953 - 1984 strengthened this conclusion. Then, a 20% resurgence in reported TB cases from 1985 - 1992 shattered this belief. The major factors contributing to this resurgence were:

- A deterioration of the TB public health infrastructure
- The HIV/AIDS epidemic
- Immigration from countries where TB is prevalent
- Transmission of TB in congregate settings (e.g., health care facilities, correctional facilities, homeless shelters)



Standard Four Drug Regimen Used to Cure TB by Date of Discovery

Figure 3 below demonstrates the rapid decline of deaths associated with TB in the United States and Iowa from 1910 - 1950. Note the dramatic decline began even before the discovery of effective TB drugs in the 1940s. Scientists liken this as part of the ‘normal’ epidemic wave of disease. During an epidemic, the number of new cases (infected individuals) increases rapidly to a peak and then falls more gradually until the epidemic is over. This happens with all diseases including TB. “In Europe, TB was present throughout the middle ages, but it was in the seventeenth century that it reached what can only be considered astounding epidemic proportions. The tide of consumption receded somewhat in the eighteenth century, only to rise again in the nineteenth century before beginning a rapid decline that continued steadily until recent times.”⁴

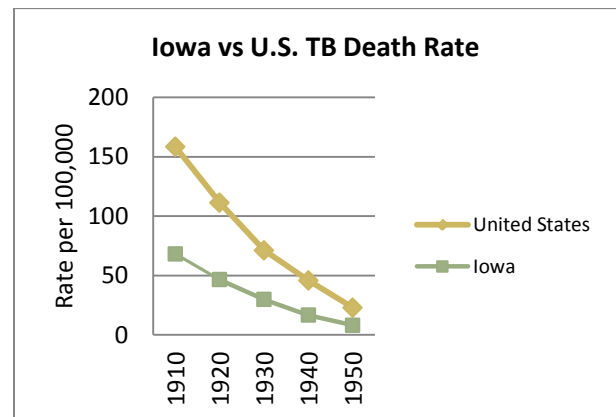


Figure 3: TB Death Rate Iowa vs. U.S. 1910-50

⁴ Captain of Death: The Story of Tuberculosis by Thomas M. Daniel

INTERNATIONAL BURDEN OF TB DISEASE:

FROM THE WORLD HEALTH ORGANIZATION

Tuberculosis (TB) remains a major global health problem. In 2012, an estimated 8.6 million people developed TB and 1.3 million died from the disease (including 320,000 deaths among HIV-positive people). The number of TB deaths is unacceptably large given that most are preventable.

Nearly 20 years after the WHO declaration of TB as a global public health emergency, major progress has been made towards 2015 global targets set within the context of the Millennium Development Goals (MDGs). Two years ahead of the deadline, the *Global Tuberculosis Report 2013* and accompanying supplement *Countdown to 2015* assess progress towards the 2015 targets and the top priority actions needed to achieve and/or move beyond them.

COUNTDOWN TO 2015: KEY FINDINGS

ON TRACK:

The rate of new TB cases has been falling worldwide for about a decade, achieving the MDG global target. TB incidence rates are also falling in all six WHO regions. The rate of decline (2% per year) remains slow. Globally by 2012, the TB mortality rate had been reduced by 45% since 1990. The target to reduce deaths by 50% by 2015 is within reach.

Two WHO regions have already achieved the 2015 targets for reduced incidence, prevalence and mortality: the Region of the Americas and the Western Pacific Region. Of the 22 high TB burden countries (HBCs) that account for about 80% of the world's TB cases, seven have met all 2015 targets for reductions in TB incidence, prevalence and mortality. Four more HBCs are on track to do so by 2015.

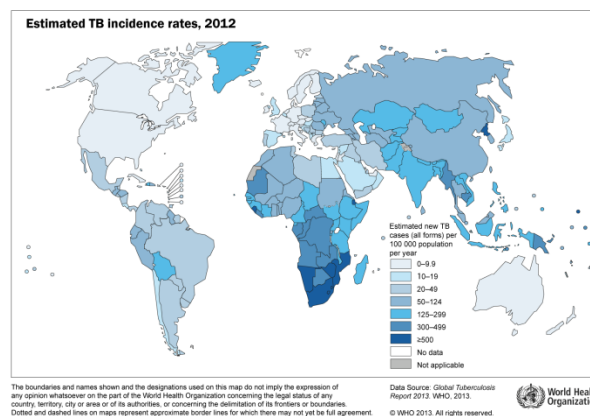
OFF TRACK:

By 2012, the level of active TB disease in the community (prevalence) had fallen by 37% globally since 1990. The target of a 50% reduction by 2015 is not expected to be achieved.

The African and European regions are currently not on track to achieve the mortality and prevalence targets. Among the 22 HBCs, 11 are not on track to reduce incidence, prevalence and mortality in line with targets. Reasons include resource constraints, conflict and instability, and generalized HIV epidemics.

Progress towards targets for diagnosis and treatment of multidrug-resistant TB (MDR-TB) is far off-track. Worldwide and in most countries with a high burden of MDR-TB, less than 25% of the people estimated to have MDR-TB were detected in 2012.

Many countries have made considerable progress to address the TB/HIV co-epidemic. However, global-level targets for HIV testing among TB patients and provision of antiretroviral therapy (ART) to those who are HIV-positive have not been reached.



The current global picture of TB shows continued progress, but not fast enough.

An estimated 1.1 million (13%) of the 8.6 million people who developed TB in 2012 were HIV-positive. About 75% of these cases were in the African Region.

Globally in 2012, an estimated 450,000 people developed MDR-TB and there were an estimated 170,000 deaths from MDR-TB. Most TB cases and deaths occur among men, but TB remains among the top three killers of women worldwide. There were an estimated 410,000 TB deaths among women in 2012, including 160,000 among HIV-positive women. Half of the HIV-positive people who died from TB in 2012 were women. Of the estimated 8.6 million new TB cases worldwide in 2012, 2.9 million were women.

There were an estimated 530,000 TB cases among children (under 15 years of age) and 74,000 TB deaths (among HIV-negative children) in 2012 (6% and 8% of the global totals, respectively).

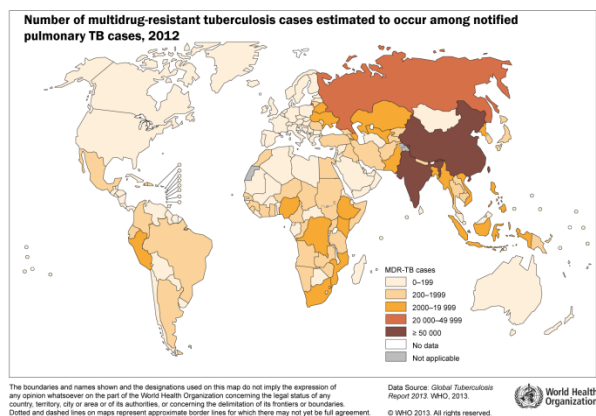
The majority of cases worldwide in 2012 were in the South-East Asia (29%), African (27%) and Western Pacific (19%) regions. India and China alone accounted for 26% and 12% of total cases, respectively.

The TB incidence rate at country level ranges substantially, with around 1,000 or more cases per 100,000 people in South Africa and Swaziland, and fewer than 10 per 100,000 population in parts of the Americas, several countries in western Europe, Japan, Australia and New Zealand.

MDR-TB AND XDR-TB DETECTION AND TREATMENT OUTCOMES

Undetected cases and treatment coverage gaps constitute a public health crisis.

Globally in 2012, data from drug resistance surveys and continuous surveillance among notified TB cases suggest that 3.6% of newly diagnosed TB cases and 20% of those previously treated for TB had MDR-TB. The highest levels of MDR-TB are found in eastern Europe and central Asia, where in some countries more than 20% of new TB cases and more than 50% of those previously treated for TB have MDR-TB.

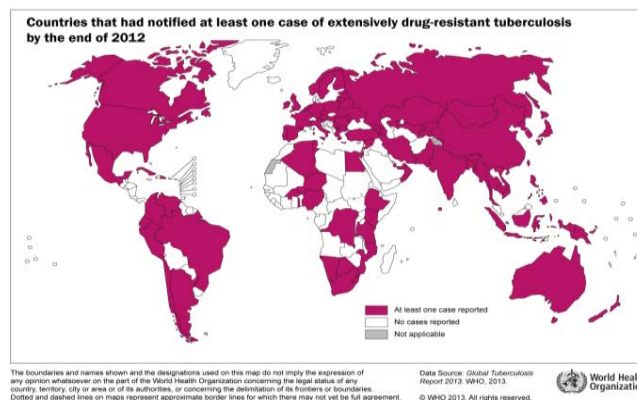


A total of 94,000 TB patients eligible for MDR-TB treatment were detected in 2012: 84,000 people with confirmed MDR-TB (i.e., resistance to both rifampicin, the most powerful TB drug, and isoniazid), plus 10,000 with rifampicin resistance detected using Xpert MTB/ RIF. This was a 42% increase in

detected cases eligible for treatment compared with 2011. The largest increases between 2011 and 2012 were in India, South Africa and Ukraine.

Just over 77,000 people with MDR-TB were started on second-line treatment in 2012, equivalent to 82% of the 94,000 newly detected cases that were eligible for treatment globally. Treatment coverage gaps for detected cases were much larger in some countries, especially in the African Region (51% enrolled in treatment), and widened in China, Pakistan and South Africa.

At least one case of extensively drug-resistant TB (XDR-TB) had been reported by 92 countries by the end of 2012. On average, an estimated 9.6% of MDR-TB cases have XDR-TB. Globally, only 48% of MDR-TB patients in the 2010 cohort of detected cases were successfully treated, reflecting high mortality rates and loss to follow-up. A treatment success rate of 75% or more for patients with MDR-TB was achieved in 34 of 107 countries.



STATUS OF TB IN THE U.S:

From CDC's Division of TB Elimination

Trends in Tuberculosis, 2012



How many cases of tuberculosis (TB) were reported in the United States in 2012?

A total of 9,945 TB cases (a rate of 3.2 cases per 100,000 persons) were reported in the United States in 2012. Both the number of TB cases reported and the case rate decreased; this represents a 5.4% and 6.1% decline, respectively, compared to 2011*. The number of reported TB cases in 2012 was the lowest recorded since national reporting began in 1953.

*Ratio calculation is based on unrounded data values.

Is the rate of TB declining in the United States?

Yes. Since the 1992 TB resurgence peak in the United States, the number of TB cases reported annually has decreased.

How do the TB rates compare between U.S.-born persons and foreign-born persons living in the United States?

In 2012, a total of 63% of reported TB cases in the United States occurred among foreign-born persons. The case rate among foreign-born persons (15.9 cases per 100,000) in 2012 was approximately 11 times higher than among U.S.-born persons (1.4 cases per 100,000).

How many people died from TB in the United States?

There were 569 deaths from TB in 2010, the most recent year for which these data are available. Compared to 2000 data, when 776 deaths from TB occurred, this represents a 27% decrease in TB deaths over a decade.

What are the rates of TB for different racial and ethnic populations†?

- American Indians or Alaska Natives: 6.3 cases per 100,000 persons
- Asians: 18.9 cases per 100,000 persons
- Blacks or African Americans: 5.8 cases per 100,000 persons
- Native Hawaiians and other Pacific Islanders: 12.3 cases per 100,000 persons
- Hispanics or Latinos: 5.3 cases per 100,000 persons
- Whites: 0.8 cases per 100,000 persons

† For this report, persons identified as white, black, Asian, American Indian/Alaska Native, native Hawaiian or other Pacific Islander, or of multiple races are all non-Hispanic. Persons identified as Hispanic may be of any race.

Is multidrug-resistant tuberculosis (MDR TB) on the rise?

Since 1993, when the TB surveillance system was expanded to include drug-susceptibility results, reported multidrug-resistant (MDR) TB cases have decreased in the United States. Among TB cases in the United States, the percentage of MDR TB cases, defined as those with no previous history of TB disease and resistance to at least isoniazid and rifampin, decreased slightly from 1.3% (99 cases) in 2011 to 1.1% (72 cases) in 2012.

Since 1997, the percentage of U.S.-born patients with MDR TB has remained below 1.0%. However, of the total number of reported primary MDR TB cases, the proportion occurring in foreign-born persons increased from 25.3% (103 of 407) in 1993 to 86.1% (62 of 72) in 2012.

How are TB data collected?

Data on TB cases are reported to CDC from 60 reporting areas, including the 50 states, the District of Columbia, New York City, Puerto Rico, and seven other U.S. jurisdictions in the Pacific and Caribbean. These cases must meet the CDC/Council of State and Territorial Epidemiologists case definition. When cases are reported, specific information is provided about the person with TB. This includes the person's race, ethnicity (either Hispanic or non-Hispanic), treatment information, and when available, drug-susceptibility test results. CDC calculates national and state TB rates, and rates for foreign-born, U.S.-born, and racial/ethnic populations. These calculations use U.S. census population estimates for the years 1993 through 2012.

TB MORBIDITY AND TRENDS IN IOWA

The number of TB cases in Iowa, as in the rest of the U.S., has significantly declined since the discovery of antibiotics that kill the TB bacilli. Despite drugs that can cure TB disease, TB remains a significant public health issue in Iowa and the rest of the country.

During the last decade, Iowa averaged over 1,300 TB infections and 45 TB disease cases each year. Figure 7 illustrates the average number of cases in Iowa each year by decade, dating back to 1930. Note that Iowa averaged 757 cases of TB disease each year during the decade of the 1940s. Figure 8 illustrates the number of LTBI each year from 2004 - 2013. Persons with untreated LTBI represent the reservoir of future TB cases.

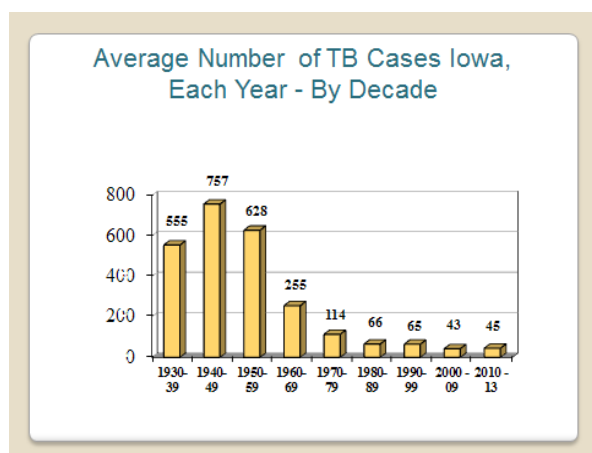


Figure 7: Average Number of TB Cases in Iowa by Decade.

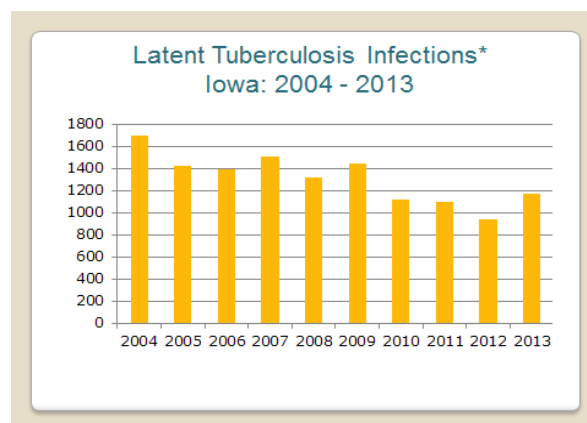


Figure 8: Number of LTBI cases each year from 2004 - 2013

DIRECTLY OBSERVED THERAPY (DOT)

DOT is a strategy used by public health officials to assure patients with TB disease are correctly treated and cured. DOT is the standard of care for all patients afflicted with TB disease. The Centers for Disease Control and Prevention (CDC), Infectious Diseases Society of America (IDS), World Health Organization (WHO), and the American Thoracic Society (ATS) recommend healthcare providers implement DOT on each case of TB disease. With DOT, a designated healthcare worker watches a patient swallow each dose of TB medication. Without DOT, many patients do not take their medication properly, resulting in disease relapse, treatment failure and development of drug resistance, including multidrug-resistant TB (MDR-TB).

In 2001, the Iowa TB Control Program began providing DOT incentive funds to increase the proportion of TB patients who receive DOT. Since implementation of incentive funding, DOT rates have risen 40% in Iowa. During this time-period, virtually all pulmonary (infectious) cases of TB have had the benefit of DOT. Clinical benefits of DOT include significant reduction in disease relapse, treatment failure and development of multidrug-resistant TB (MDR-TB).

CONTACT INVESTIGATIONS

The lungs are the most common site for TB disease. In Iowa, pulmonary cases accounted for 64% of the total cases during the last ten years (Figure 9). Patients with either pulmonary (lungs) or laryngeal (throat) TB are infectious.

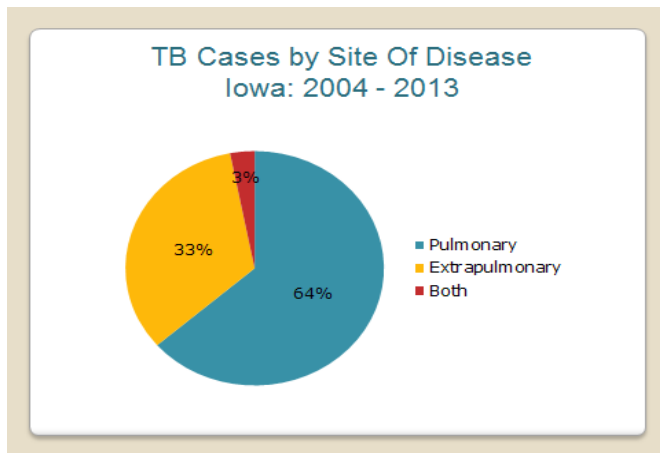


Figure 9: Iowa TB Cases by Site of Disease 2004-2013

All infectious cases require a contact investigation by a LPHA to identify contacts who:

- Have LTBI so treatment for LTBI can be given and active disease can be prevented.
- Have TB disease so they may be treated and further transmission can be stopped.

TB Contact Investigations, Iowa 2004-2013
Cases for investigation: 248
Number of contacts identified: 4,796
Number of contacts who completed evaluation: 4,098 (85%)
Number of LTBI identified: 813 (20%)
Number of TB cases identified: 24 (<1%)

Figure 10: Contact Investigation Data

Each infectious TB case in the United States has 10 contacts identified on average per CDC. Approximately, 20%-30% of all contacts have LTBI, and 1% has TB disease. Of those contacts that ultimately will have TB disease, approximately half acquire disease in the first year after exposure. For this reason, contact investigations constitute a crucial prevention strategy.

LPHAs in Iowa are responsible for conducting investigations of infectious TB. Public Health agencies work closely with other agencies (e.g., Community Health Centers, private providers, labs etc.) to ensure the prompt reporting of suspected TB cases. A major challenge for LPHAs is the time involved to complete contact investigations. In order to be considered "evaluated", contacts to infectious TB cases must

complete all TB testing, often requiring two TB tests. Persons with positive tests require a medical evaluation to include a chest x-ray to rule out active TB. LPHAs spend considerable amounts of resources in their efforts to complete the evaluation of contacts exposed to infectious TB.

The TB Control Program Manager and TB Nurse Consultant provide consultation to LPHAs on each infectious case of TB. Consultation consists of:

- When to initiate a contact investigation
- Assigning priorities to contacts
- Diagnostic and public health evaluation of contacts
- When to expand a contact investigation, and
- Data management of contact investigations

Contact investigations are timely, costly and consume limited resources from local, state and federal assets. "Contact investigations typically require hundreds of interdependent decisions, the majority of which are made on the basis of incomplete data, and dozens of time consuming interventions." ⁵ For these reasons, consultation and collaboration among LPHAs and the TB Program is vital to the diagnostic and public health evaluation of contacts.

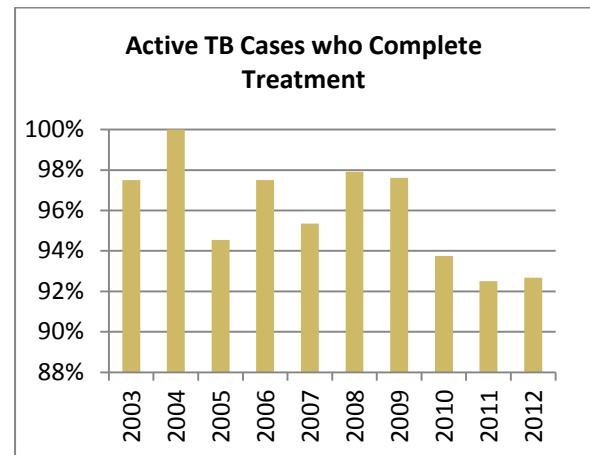


Figure 11: Percentage of Iowa TB Cases who Complete Therapy 2003-2012

Figure 11 represents the percentage of patients who completed treatment from 2003 - 2012. During this period, all patients with infectious TB completed treatment. Patient's not completing treatment had extrapulmonary TB, were not infectious and did not represent a public health risk.

⁵ Guidelines for the Investigation of Contacts of Persons with Infectious TB – Recommendations from the National TB Controllers Association and CDC).

TB CASES IN IOWA

In 2013, Iowa reported 47 cases of active TB disease. Since 2004, Iowa has averaged 45 cases of TB each year. (Figure 12: Number of TB cases 2004 - 2013). Although case rates are declining, many cases have existing co-morbidities that make TB treatment considerably more complex and require extensive care, including the use of second line drugs. Treatment with second line drugs is complicated and expensive, requiring expert consultation and extended treatment durations.

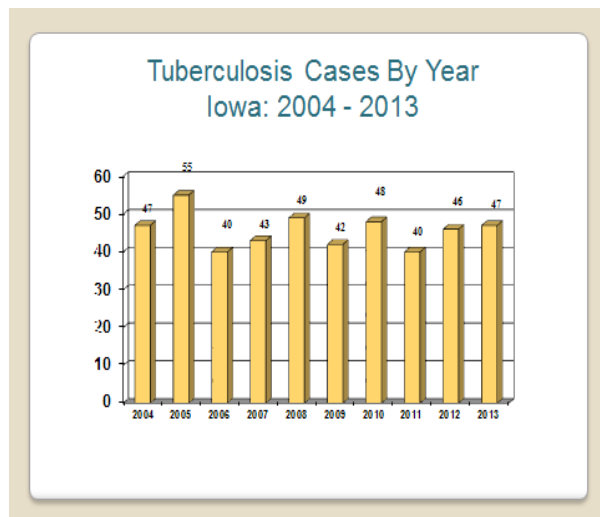


Figure 12: Number of Iowa TB Cases per Year 2004-2013

Counties with larger population centers such as Polk, Woodbury and Black Hawk report the majority of TB cases. However, as Figure 13 illustrates, many (52/99) Iowa counties reported TB cases during calendar years 2004 - 2013.

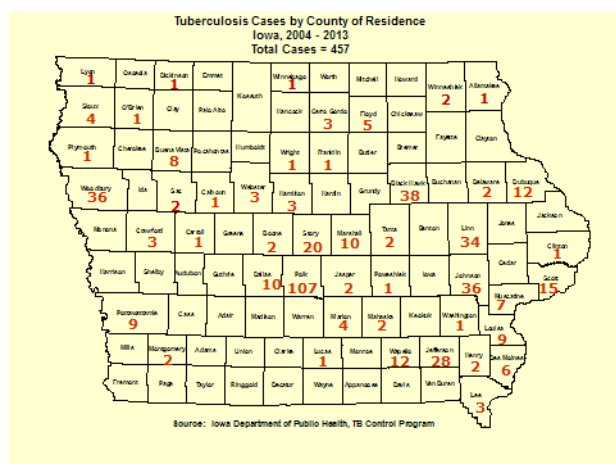


Figure 13: Iowa Counties with TB Cases 2004 - 2013

The 2013 TB case rate for Iowa is 1.5 cases per 100,000 persons. This is significantly lower than the 2012 national average of 3.2 cases per 100,000 persons. Iowa owes its low TB case rate in part to proficient contact investigations, healthcare providers observance of treatment guidelines, adherence to DOT for active disease cases and the provision of medication for LTBI to thousands of Iowan's annually.

The proportion of reported TB cases in non-U.S. born persons has increased significantly in the past two decades. In 1995 for example, non-U.S. born persons accounted for 38% of reported TB cases in Iowa. From 2004 - 2013, non-U.S. born persons accounted for 67% of reported TB cases in Iowa (figure 14). Non-U.S. born persons account for only four percent of the Iowa population, highlighting the disparity. The decreasing numbers of U.S. born cases are due in part to effective TB control practices in this country.

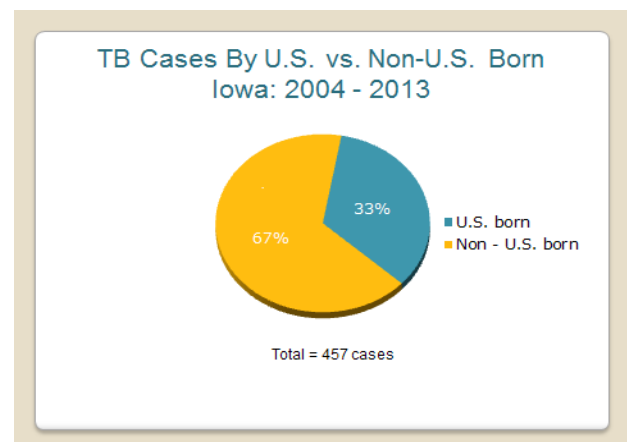


Figure 14: Percent of U.S. born Versus Non-U.S born TB cases in Iowa 2004 - 2013

As illustrated by the WHO World TB Report, in many parts of the developing world, TB is still widespread and remains a leading cause of death. Immigration of people from these countries to the United States illustrates what happens in one part of the world, directly impacts other parts of the world. Effective targeted testing programs for newly arriving refugees, immigrants, and students play a major role to identify and treat these populations.

COUNTRY OF ORIGIN DATA

For 2013, 33 individuals emigrating from 18 countries (excludes U.S.) developed TB in Iowa. Figure 15 represents 308 individuals, emigrating from 52 countries (excludes U.S.) who developed TB disease after their arrival to Iowa during 2004 - 2013. As the map illustrates, TB anywhere is TB everywhere. Approximately 95% of all patients with active TB disease live in the developing world, where 99% of all TB deaths occur. TB is a good example of the global nature of public health. It is important to implement consistent and aggressive public health measures to halt TB disease, which left untreated, kills half of its victims.

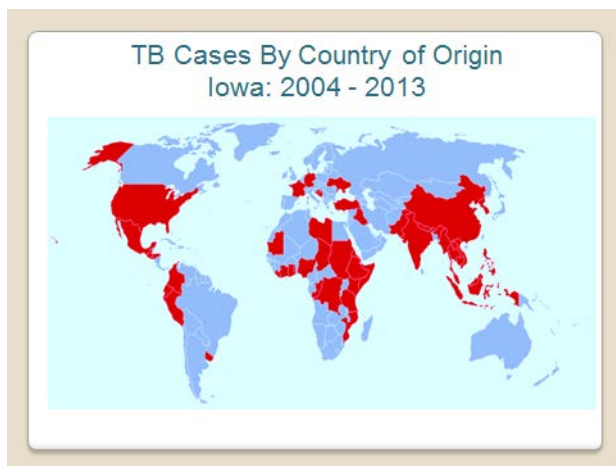


Figure 15: Iowa TB Cases by Country of Origin 2004-2013

TB CONTROL PROGRAM FUNDING

In fiscal year 2013, the TB Control Program received funds from the federal TB Cooperative Grant and state funds totaling \$535,806. Federal funds comprise 77% of the total budget while state funds comprise 23% of the program finances. (Figures 16-18)

Funding Source FY 2013	
Federal TB Cooperative Grant	\$413,717
State Prescription Services	\$65,645
State TB	\$56,444
Total	\$535,806

Figure 16: FY 2013 total program funds

Program expenditures are divided into three main categories: **program infrastructure** (staff salary and operating expenses), **contracts** (including incentive funding for LPHAs to conduct directly observed therapy, pharmacy for prescription services and the State Hygienic lab)), and **TB medications**. The funding distributions for these three categories are illustrated in Figure 17.

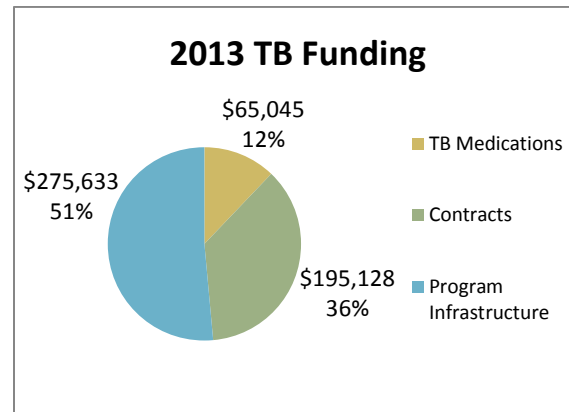


Figure 17: FY 2013 total program funds by funding source

Figure 18 illustrates how the TB Program disperses available contractual funds. LPHAs receive incentive funding for DOT and medical evaluation services. The funds for the pharmacy service support providing free antibiotics for all Iowans with LTBI or TB disease. Funds for the State Hygienic Lab support rapid identification of TB, smear, culture and drug sensitivity testing.

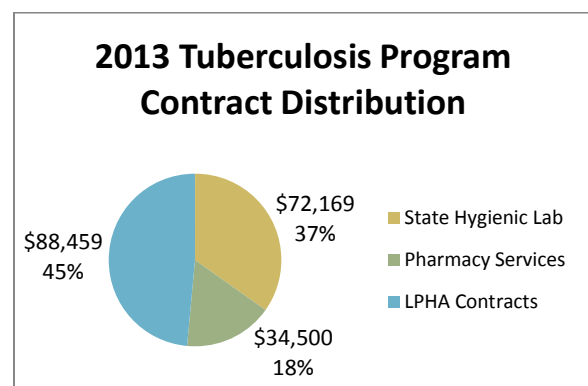


Figure 18: FY 2013 total funds distribution

CONTRACT FUNDS

STATE HYGIENIC LAB

The TB Control Program contracts with the State Hygienic Lab (SHL) through the *Tuberculosis Elimination Cooperative Agreement*. In 2013, the TB Control Program contract amount with SHL was \$72,169 as demonstrated in figure 18. This agreement allows SHL to be the primary source for public health submission of suspect TB patient's specimens (typically sputum) for evaluation. The goal of SHL is to provide objective information within 24 - 48 hours of specimen receipt for smear and TB NAAT (rapid detection of MTB complex as well as rifampin drug resistance). SHL works with CDC to transfer clinical specimens of patients for whom second line drug testing is necessary. Additionally, SHL coordinates genetic testing of all culture positive MTB specimens with CDC to allow genetic linking of cases nationwide. The ability to rapidly and accurately detect drug resistance in *Mycobacterium tuberculosis* Complex (MTBC) clinical isolates is critical for the appropriate treatment of patients suffering from TB and the effectiveness of the TB Control program.

SHL also is one of the few labs in the state that performs Interferon-Gamma Release Assays (IGRAs). IGRAs are whole-blood tests that can aid in diagnosing TB infection. SHL offers two IGRAs that have been approved by the U.S. Food and Drug Administration (FDA) and are commercially available in the U.S: QuantiFERON TB Gold In-Tube test (QFT-GIT); and T-SPOT® TB test (T-Spot). IGRAs are of particular use to LPHAs in the course of a contact investigation to an infectious TB patient. In a contact investigation, IGRAs are offered to Iowa citizens free of charge through the SHL.

PHARMACY SERVICES

The TB Program contracts with NJL Pharmacy of Pleasant Hill, Iowa to dispense TB medications for both LTBI and active TB disease patients. In 2013, the TB Control program spent \$65,045 on TB medications for Iowa citizens (Figure 17). The contract for pharmacy services is \$34,500 as demonstrated in Figure 18.

LOCAL PUBLIC HEALTH AGENCIES

Iowa is unique in its ability and desire to provide incentive funding for LPHA's who provide directly observed therapy (DOT) to active pulmonary patients in their county. DOT is a standard of care for TB in which patients are observed to ingest each dose of anti-tuberculosis medications, to maximize the likelihood of completion of therapy. Programs utilizing DOT as the central element in a comprehensive, patient-centered approach to case management (enhanced DOT) have higher rates of treatment completion than less intensive strategies.

The CDC, American Thoracic Society (ATS) and Infectious Disease Society of America (IDSA) all recommend healthcare providers implement DOT on each active case of TB. Eligibility of LPHAs for DOT incentive funding may vary by funding cycle due to funding availability and the number of TB cases; but generally, all infectious (pulmonary and laryngeal), pleural, HIV positive, and childhood cases of TB disease are eligible. In 2013, the Iowa TB Control Program spent \$88,459 on contracts with LPHAs for DOT services as shown in Figure 18.

IOWA TUBERCULOSIS CONTROL PROGRAM

REMEMBERING OUR HISTORY, WORKING TOWARDS TB ELIMINATION



CERTAMEN AD FINEM PERGIT
THE FIGHT CONTINUES
TO THE END

Working together, the activities of the TB Control Program, local health departments, private clinicians and the State Hygienic Laboratory have led to historic low rates of TB morbidity through:

- Disease surveillance and reporting
- Clinical consultation and education
- Treatment and prescription services
- Diagnostic and public health evaluation of contacts to infectious TB
- Rapid identification of TB by State Hygienic Lab



Tuberculosis (TB) is a disease as old as antiquity. Archeologists have found mummies with signs of it. Your grandparents or great-grandparents called it "consumption". Although an ancient disease, TB still affects Iowa's today.



In 1902, the ALA first used the Cross of Lorraine as a symbol for the "crusade" against TB. Many old TB sanatoriums prominently displayed this battle standard atop their buildings. Some claim a dual purpose was to "warn" others to stay away from the area as people with deadly TB were gathered.

